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PROCEEDINGS  
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THE ROYAL SOCIETY.

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1846.

No. 67.

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November 19, 1846.

Sir W. BURNETT, M.D., in the Chair.

“On the Automatic Registration of Magnetometers and other Meteorological Instruments, by Photography.” By Charles Brooke, M.B., F.R.C.S.E. Communicated by G. B. Airy, Esq., F.R.S., Astronomer Royal.

The author enters into fuller details than he had done in his former communication to the Society, which was read on the 18th of June, respecting the construction of the instrument, the preparation of the highly sensitive photographic paper employed in the process, and the minute adjustments necessary for ensuring accuracy in registering the results.

In a supplement to the above paper, the author describes the methods he has contrived for obtaining a similar automatic registration of the heights of the barometer and thermometer, by suitable additions to the same apparatus which registers the magnetic variations.

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November 26, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

W. R. Grove, Esq., M.A., F.R.S., delivered the Bakerian Lecture —“On certain Phenomena of Voltaic Ignition, and on the Decomposition of Water into its constituent Gases by heat.”

The author refers to an eudiometer, an account of which was published by him in the ‘Philosophical Magazine’ for 1840, formed of a glass tube, into the closed extremity of which a loop of platinum wire was sealed. The gases to be analysed were mixed in this tube with a given volume of oxygen and hydrogen, and detonated or slowly combined by the voltaic ignition of the platinum wire. He was thence led to try a further set of experiments on the analysis, by this instrument, of such gases and vapours as are decomposable

by heat; the process being capable of much greater exactness than the received one of passing them through ignited tubes. The results of the analyses of several gases by this means are given in the paper. When carbonic acid and hydrogen are mixed in equal volumes and exposed to the ignited wire, the hydrogen abstracts oxygen from the carbonic acid, and leaves carbonic oxide. Conversely, when carbonic oxide is exposed over water to the ignited wire, it abstracts oxygen from the aqueous vapour, and forms carbonic acid.

It thus appeared, that provided there were bodies present capable of absorbing by affinity the elements of water, ignited platinum would either compose or decompose water. The author was thence led to hope that he might by ignited platinum decompose water into its constituents, without absorption by other bodies, and thus produce converse effects to those already known. In this he ultimately succeeded by various methods, in some of which the ignition was produced by electrical means; in others by ordinary calorific processes, such as the oxyhydrogen blowpipe, &c.

A platinum wire is ignited at the closed extremity of a species of tube retort, full of pure water, and having a narrowed neck close above the wire; as soon as the wire becomes incandescent, it forms around itself an atmosphere of vapour which it immediately decomposes; a natural valve being formed by the conflict of ascending gas and descending water, the bubbles of mixed gas are cut off by an intermittent action, and thus, as their recombination is prevented, a volume of gas collects in the bend of the tube and is ultimately expelled at its orifice. If, again, a button of platinum be fully ignited by the oxyhydrogen blowpipe, and plunged into water previously heated to nearly its boiling-point, bubbles of mixed gas ascend and may be collected by an inverted tube. The electrical spark is shown to be capable of decomposing aqueous vapour, and various other modes of producing the same results are given.

Some theoretical views are then advanced as to the spheroidal state which appears to the author to be intermediate between that of ebullition and decomposition; as to the probable non-existence of water or steam in the interior of the earth, and as to the antagonism between physical repulsion and chemical affinity.

In a supplementary paper, the author considers how far catalysis affects the phenomenon, and regards the decomposition thus produced as presenting a parallel effect produced by the force of heat, to that known to be produced by electricity; he considers it explanatory of the decomposition of water by the electrical spark as in the experiments of Pearson and Wollaston. Some further experiments are given, in which iridium and osmium and silica are substituted for platinum; and also some experiments on the liquids bromine and chloride of iodine, both of which yield pure oxygen when exposed to the ignited wire in Mr. Grove's apparatus. These last experiments cannot however be long continued in consequence of these liquids ultimately attacking both the glass and the platinum. In conclusion, the author calls attention to the general evolution of

permanent gas from all liquids, except the metals, when exposed to intense heat.

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December 17, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

“Researches on Physical Geology.”—Part I. The Figure and Primitive Formation of the Earth. By Henry Hennessy, Esq. Communicated by Major North Ludlow Beamish, K.H., F.R.S.

The author's investigations of the figure of the earth proceed on the hypothesis of its having originally been a heterogeneous fluid mass, possessing only such general properties as those which have been established for fluids; and independently of the supposition, with which the theory has generally been complicated, that the volume of the entire mass, and the law of the density of the fluid, have suffered no change in consequence of the solidification of a part of that fluid. Assuming the figure of the mass to be an ellipsoid of revolution, the author obtains general analytical expressions for its ellipticity, and for the variation of gravity at its surface. He gives a general sketch of the consequences that may result from the improved hypothesis of the primitive figure of the earth, to physical geology, that is, to the changes occurring upon the external crust of the earth during the process of its solidification, resulting both from calorific and chemical changes taking place among its different parts, and giving rise to a process of circulation throughout the fluid portions of the mass.

The present memoir is only the first of a series which the author announces it is his intention to communicate to the Society on the same subject.

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January 7, 1847.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

Sir George Back, Capt. R.N., was elected into the Society.

The following paper was read:—

“*Quelques Recherches sur l'Arc Voltaïque; et sur l'influence qu'exerce le Magnétisme, soit sur cet Arc, soit sur les Corps qui transmettent les Courants Electriques Discontinus.*” By M. Auguste De la Rive, Foreign Member of the Royal Society, Professor in the Academy of Geneva, Corresponding Member of the Academy of Sciences of Paris, &c.

In the first section of this memoir the author gives a detailed description of the phenomena exhibited by the luminous voltaic arc produced either in a vacuum or in atmospheric air, or in hydrogen gas, by employing electrodes of different kinds of conducting sub-